

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A plasma processing apparatus comprising:

a plasma chamber in which a high-density plasma is generated;

a sample chamber in communication with the plasma chamber for housing a sample to be processed using the plasma; and

a protection tube for protecting an inner wall of the plasma chamber from deposition of a product that results from the plasma processing, wherein

the protection tube is inserted in the plasma chamber and comprises a plurality of pieces disposed in an axial direction of the protection tube in relation to a distribution of temperatures in the plasma chamber during the plasma processing, and

one of the plurality of pieces is shorter in axial length than another piece disposed farther from the sample chamber than said one of the plurality of pieces

~~the plurality of pieces is disposed in an axial direction of the protection tube, and~~

~~each of the plurality of pieces is shorter in axial length than a piece disposed at a location where a gradient of the temperatures during the plasma processing is smaller.~~

2. (Currently Amended) The plasma processing apparatus according to Claim 1,

wherein

the plasma chamber is tubular in shape, and

the protection tube is tubular in shape, ~~and~~

~~each of the plurality of pieces is a tubular member.~~

3. (Cancelled)

4. (Original) The plasma processing apparatus according to Claim 1, wherein the protection tube is provided with at least one groove formed on an inner wall thereof in parallel with an axis of the protection tube.

5. (Original) The plasma processing apparatus according to Claim 1, wherein the protection tube is provided with a plurality of grooves formed on the inner wall thereof in parallel with an axis of the protection tube at substantially equal circumferential intervals.

6. (Original) The plasma processing apparatus according to Claim 1, wherein the protection tube is made of quartz.

7. (Original) The plasma processing apparatus according to Claim 1, wherein the sample is subjected to sputtering using the plasma.

8. (Original) The plasma processing apparatus according to Claim 1, wherein the plasma is an electron cyclotron resonance plasma.

9. (Original) The plasma processing apparatus according to Claim 1, wherein the plasma is an inductively coupled plasma.

10. (Original) The plasma processing apparatus according to Claim 1, wherein the plasma is a helicon wave plasma.

11. (Currently Amended) A plasma processing apparatus comprising:
a plasma chamber in which a high-density plasma is generated;
a sample chamber in communication with the plasma chamber for housing a sample to be processed using the plasma; and

a protection tube for protecting an inner wall of the sample chamber from deposition of a product that results from the plasma processing, wherein

the protection tube is inserted in the sample chamber and comprises a plurality of pieces disposed in an axial direction of the protection tube ~~in relation to a distribution of temperatures in the sample chamber during the plasma processing, and~~

one of the plurality of pieces is shorter in axial length than another piece disposed farther from the plasma chamber than said one of the plurality of pieces

~~the plurality of pieces is disposed in an axial direction of the protection tube, and
each of the plurality of pieces is shorter in axial length than a piece disposed at a location where a gradient of the temperatures during the plasma processing is smaller.~~

12. (Currently Amended) The plasma processing apparatus according to Claim 11, wherein

the sample chamber is tubular in shape, and

the protection tube is tubular in shape, ~~and~~

~~each of the plurality of pieces is a tubular member.~~

13. (Cancelled)

14. (Original) The plasma processing apparatus according to Claim 11, wherein the protection tube is provided with at least one groove formed on an inner wall thereof in parallel with an axis of the protection tube.

15. (Currently Amended) The plasma processing apparatus according to Claim 11 ~~[[14]]~~, wherein the protection tube is provided with a plurality of grooves formed on the inner wall thereof in parallel with an axis of the protection tube at substantially equal circumferential intervals.

16. (Original) The plasma processing apparatus according to Claim 11, wherein the protection tube is made of quartz.

17. (Original) The plasma processing apparatus according to Claim 11, wherein the sample is subjected to etching using the plasma.

18. (Original) The plasma processing apparatus according to Claim 11, wherein the sample is subjected to chemical vapor deposition using the plasma.

19. (Original) The plasma processing apparatus according to Claim 11, wherein the plasma is an electron cyclotron resonance plasma.

20. (Original) The plasma processing apparatus according to Claim 11, wherein the plasma is an inductively coupled plasma.

21. (Original) The plasma processing apparatus according to Claim 11, wherein the plasma is a helicon wave plasma.

22. (Cancelled)

23. (Cancelled)

24. (Currently Amended) A plasma processing apparatus comprising:
a plasma chamber in which a high-density plasma is generated;
a sample chamber in communication with the plasma chamber for housing a sample to be processed using the plasma; and

a protection tube comprising a plurality of pieces disposed in the plasma chamber for protecting an inner wall of the plasma chamber from deposition of a product that results from plasma processing, wherein

each of the plurality of pieces is so coupled to another piece so as not to prevent expansion of ~~that another~~ of the other piece, and

at least one of the plurality of pieces has an end portion that is wider in inside diameter and an end portion of another one of the plurality of pieces that is coupled to the wider inside diameter portion is narrower in outside diameter.

25. (New) The plasma processing apparatus according to Claim 1, wherein said one of the plurality of pieces is disposed nearest to the sample chamber.

26. (New) The plasma processing apparatus according to Claim 11, wherein said one of the plurality of pieces is disposed nearest to the plasma chamber.